

SUPPORT FOR THE AMENDMENTS

This Amendment amends Claims 1-4 and 7. Support for the amendments is found in the specification and claims as originally filed. In particular, in Claim 1 support for the chain end sealing agent "range of 4 to 10 % by mole" is found in the specification at page 15, lines 17-20 ("0.5 to 10% by mole") and in Tables 1-2, Examples 3-8 ("4% by mole"); support for "an intrinsic viscosity of the polyamide is 0.6 to 1.0 dl/g" is found in the specification at least at page 12, lines 20-25 ("0.6 to 2.0 dl/g") and Tables 1-2, Examples 3-8 ("1.0 dl/g"); and support for "a range of 20:80 to 50:50" is found in the specification at least at page 24, lines 23-24 ("20:80 to 70:30 and more preferably range of 25:75 to 50:50"). In Claim 2, support for "a range of 55:45 to 40:60" is found in Example 1 ("55:45"). In Claim 3, support for a fraction of sealed chain ends of 35% or greater" is found in the specification at least at page 12, last line. In Claim 4, support for "a range of 0.001 to 0.8 dtex" is found in the specification at page 15, lines 23-24. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-8 will be pending in this application. Claim 1 is independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the personal interview on December 10, 2008.

As discussed at the personal interview, the present invention provides a separator for alkaline batteries. The separator has a non-woven fiber structural material comprising a polyamide fiber and a cellulose fiber as main component fibers. A chain end sealing agent

used in the preparation of the polyamide provides the separator with improved oxidation resistance. The intrinsic viscosity of the polyamide results in excellent melt spinning and mechanical properties. Specification at abstract; page 6, lines 16-19; page 12, lines 20-25.

Claims 1-8 are rejected under 35 U.S.C. 103(a) over U.S. Patent No. 5,366,832 ("Hayashi") in view of U.S. Patent No. 6,156,869 ("Tamura").

Hayashi discloses a separator for alkaline batteries comprising as at least part of the main fibers a fibrillated product of cellulose fiber. Another main fiber can be a synthetic fiber. The synthetic fiber can be a polyamide fiber. Hayashi at abstract; column 9, lines 4-5.

However, Hayashi fails to suggest (ii) the polyamide fiber features of independent Claim 1.

Hayashi does not expressly teaches that (ii) the polyamide fiber is a fiber formed with a polyamide constituted with a dicarboxylic acid unit and a diamine unit, the dicarboxylic acid unit comprising 60% by mole or more and 100% by mole or less of a terephthalic acid unit and the diamine unit comprising 40% by mole or more and 99% by mole or less of a 1,9-nonanediamine unit. Office Action at page 3, lines 4-7.

Tamura discloses a method for producing polyamides which comprises a step of polycondensing a dicarboxylic acid component having a terephthalic acid content of from 60 to 100 mol % and a diamine component in which the amount of 1,9-nonanediamine and/or 2-methyl-1,8-octanediamine falls between 60 and 100 mol % to form a primary polycondensate, followed by polymerizing the primary polycondensate into a polyamide. Tamura at abstract.

Tamura discloses that the polycondensation can be effected in the presence of a terminal-blocking agent, and that in general it is desirable that the amount of the agent to be used falls between 0.1 and 15 mol % relative to the number of mols of all dicarboxylic acids and diamines used for the polycondensation. Tamura at column 9, lines 40-41; column 10,

lines 21-29. However, in all of Tamura's examples the amount of terminal-blocking agent is 1.5 mol%.

Tamura discloses that the primary polycondensate has a limiting viscosity of at least 0.08 dl/g. Tamura at column 10, lines 42-43; column 11, lines 34-38. Tamura also discloses that the polyamide, formed from the primary polycondensate, can have a limiting viscosity of 1.31, 1.26, 1.30, 1.29, 1.25 or 0.80 dl/g. Tamura at Tables 1-2, Examples 1-4 and Comparative Examples 3-4, respectively.

However, the cited prior art fails to suggest the combination of features of independent Claim 1 such that "a **chain end sealing agent** used in the preparation of the polyamide is used in an amount in the range of **4 to 10 % by mole** based on the total of the amount by mole of the dicarboxylic acid and the amount by mole of the diamine, and an **intrinsic viscosity** of the polyamide is **0.6 to 1.0 dl/g**".

Tamura's "limiting viscosity" is equivalent to independent Claim 1's "intrinsic viscosity". See, e.g., Textbook of Polymer Science, Second Edition, page 84, copy attached.

Although the polyamide of Tamura's Comparative Example 4 has a limiting viscosity of 0.80 dl/g, which is inside the independent Claim 1 range of "0.6 to 1.0 dl/g", this polyamide also has 1.5 mol% terminal-blocking agent (i.e., chain end sealing agent), which is outside of the Claim 1 range of "4 to 10 % by mole".

A polyamide as featured in independent Claim 1 with "a chain end sealing agent ... in an amount in the range of 4 to 10 % by mole based on the total of the amount by mole of the dicarboxylic acid and the amount by mole of the diamine" can have "an intrinsic viscosity of ... 0.6 to 1.0 dl/g". As discussed above, the chain end sealing agent used in the preparation of the polyamide provides the separator with improved oxidation resistance, and the intrinsic viscosity of the polyamide results in excellent melt spinning and mechanical properties.

Because the cited prior art fails to suggest all the limitations of independent Claim 1, the rejection under 35 U.S.C. 103(a) should be withdrawn.

Claims 1-6 and 8 are rejected on the ground of nonstatutory obviousness-type double patenting over Claims 1-3 and 7-10 of U.S. Patent No. 5,366,832 in view of Tamura.

Claim 1-3 and 7-10 of U.S. Patent No. 5,366,832 disclose a separator for alkaline batteries containing a fibrillated product of a cellulose fiber. The separator can also contain a synthetic fiber, which can be "a **polyvinyl alcohol** fiber".

As discussed above, Tamura discloses a method for producing **polyamides**.

There is no motivation or suggestion to replace the polyvinyl alcohol synthetic fiber of Claim 1-3 and 7-10 of U.S. Patent No. 5,366,832 with fibers of Tamura's polyamides.

Furthermore, there is no reasonable expectation that the disclosure of "synthetic fiber" in Claim 1-3 and 7-10 of U.S. Patent No. 5,366,832 would have led the skilled artisan to polyamide fibers, considering the extremely large number of all possible synthetic fibers.

In any event, Claims 1-3 and 7-10 of U.S. Patent No. 5,366,832 in view of Tamura fails to suggest the combination of features of independent Claim 1 in which "a **chain end sealing agent** used in the preparation of the polyamide is used in an amount in the range of **4 to 10 % by mole** based on the total of the amount by mole of the dicarboxylic acid and the amount by mole of the diamine, and an **intrinsic viscosity** of the polyamide is **0.6 to 1.0 dl/g**".

Because Claims 1-3 and 7-10 of U.S. Patent No. 5,366,832 in view of Tamura fail to suggest all the limitations of independent Claim 1, and there is no reasonable expectation of success, the obviousness-type double patenting should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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Attached: Textbook of Polymer Science, Second Edition, page 84

The measurement by light scattering of the size of particles considerably larger than polymer molecules is discussed by van de Hulst (1957), Billmeyer (1964a), Kerker (1969), and Livesey (1969).

GENERAL REFERENCES

Peaker 1959; Billmeyer 1964a; Eskin 1964; Kratochvil 1964, 1966c; McIntyre 1964; Kerker 1969.

D. Solution Viscosity and Molecular Size

The usefulness of solution viscosity as a measure of polymer molecular weight has been recognized ever since the early work of Staudinger (1930). Solution viscosity is basically a measure of the size or extension in space of polymer molecules. It is empirically related to molecular weight for linear polymers; the simplicity of the measurement and the usefulness of the viscosity-molecular weight correlation are so great that viscosity measurement constitutes an extremely valuable tool for the molecular characterization of polymers.

Experimental methods

Measurements of solution viscosity are usually made by comparing the *efflux time* t required for a specified volume of polymer solution to flow through a capillary tube with the corresponding efflux time t_0 for the solvent. From t , t_0 , and the solute concentration are derived several quantities whose defining equations and names are given in Table 3-4. Two sets of nomenclature are in use for these quantities; one (Cragg 1946) has had long and

TABLE 3-4. Nomenclature of solution viscosity

Common Name	Recommended Name	Symbol and Defining Equation
Relative viscosity	Viscosity ratio	$\eta_r = \eta/\eta_0 \approx t/t_0$
Specific viscosity	—	$\eta_{sp} = \eta_r - 1 = (\eta - \eta_0)/\eta_0 \approx (t - t_0)/t_0$
Reduced viscosity	Viscosity number	$\eta_{red} = \eta_{sp}/c$
Inherent viscosity	Logarithmic viscosity number	$\eta_{inh} = (\ln \eta_r)/c$
Intrinsic viscosity	Limiting viscosity number	$[\eta] = (\eta_{sp}/c)_{c \rightarrow 0} = [(\ln \eta_r)/c]_{c \rightarrow 0}$

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TEXTBOOK OF POLYMER SCIENCE

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